745 Internal Defibrillation/Implantable Antiarrhythmic Devices: Newer Methods and Approaches

Tuesday, March 18, 1997, 10:30 a.m.–Noon
Anaheim Convention Center, Room A6

10:30

745-1 The Isoelectric Window After Defibrillation Shocks: Is It Truly Electrically Quiescent?

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Previous studies have reported an isoelectric window lasting 40–100 ms after defibrillation shocks after which an activation front arises in one region (the site of earliest activation, EA) and propagates across the entire epicardium. We sought to determine whether the isoelectric window is really electrically silent or whether activation occurs during this interval but only propagates locally (Locally-Propagated Activity, LPA) in a small region before it blocks and is extinguished. Sequences of epicardial activations were mapped before and after attempted defibrillation (RV-SVC coils) with biphasic shocks having strength near defibrillation threshold (DFT) in 5 pigs. Unipolar epicardial electrograms [V(t)] were acquired from a 504 electrode sock ($\cong$ 4 mm interelectrode spacing) pulled over the ventricles. In each animal, 10 shocks at DFT were delivered after 10 s of VF induction. Local activations were defined by dV/dt ≤ -0.5 V/s and were detectable starting 20 ms after the shock. *Results:* LPAs were observed following all successful (S) and failed (F) shocks. LPAs occurred in 3 $\pm$ 3 regions and each region contained 7 $\pm$ 6 recording electrodes. While the time after the shock was not different for the appearance of EAs (64 $\pm$ 10 ms for S and 62 $\pm$ 9 ms for F) the time of appearance was different ($P < 0.001$) for S LPAs (41 $\pm$ 16 ms) than F LPAs (35 $\pm$ 8 ms). *Conclusion:* The isoelectric window is not electrically silent. LPAs exist with successful and failed shocks near the DFT that can only propagate locally before blocking and extinguishing. Early LPAs may cause a greater dispersion of refractoriness than late LPAs which may cause activation arising from EAs to block and reenter, leading to the resumption of fibrillation following failed shocks.

10:45

745-2 Improved Safety of Transvenous Atrial Defibrillation During Wide QRS Tachycardia by Introduction of a Delay Interval

A. Natale, K.H. Newby, J. Brandon, M. Kearney, P.H. Henderson, A. Wolverton, S. Beheiry, R. Fanelli, E. Pisano'. *Duke University Medical Center/VA Medical Center, Durham, NC, USA, Casa Sollievo Della Sofferenza, San Giovanni Rotondo, Italy*

Atrial defibrillation during wide QRS complex tachycardia has a higher likelihood to cause ventricular fibrillation. In 10 patients undergoing atrial defibrillation, we assessed whether the safety of atrial defibrillation during wide QRS tachycardia could be improved by delivering the shock after a fixed delay from the sensed right ventricular electrogram. Atrial fibrillation was performed using two nona-polar catheters placed in the right atrium and coronary sinus, respectively. After appropriate sensing of the local right ventricular electrogram was verified, atrial defibrillation threshold was obtained. In each patient, atrial defibrillation was subsequently attempted during ventricular pacing at 280 msec cycle length by triggering shocks at the atrial defibrillation energy level on the beginning of the local ventricular electrogram and after a 50 and 70 msec delays from the same recording. Shock synchronized on beginning of the local right ventricular electrogram produced degeneration to ventricular fibrillation in 7 out of 10 patients. When atrial defibrillation was performed giving the shocks 50 msec after the beginning of the right ventricular electrogram proarrhythmia was seen in 1 patient out of 10. None of the patients had shock-induced proarrhythmia using a delay of 70 msec. In conclusion, atrial defibrillation after a fixed delay from the beginning of the sensed right ventricular electrogram may reduce the risk of proarrhythmia following shocks delivered during wide QRS complex tachycardia.

11:00

745-3 Efficacy of Sotalol and Metoprolol in Patients with an Implanted Cardioverter Defibrillator

V. Kühlkamp, C. Mewis, V. Dömberger, R. Suchalla, J. Mermi, L. Seipel. *Medical Department III, University of Tübingen, Germany*

Sotalol (SOT) is the most important antiarrhythmic drug for the treatment of sustained ventricular tachyarrhythmias. However it is unknown whether its efficacy is due to its betablocking activity or its class three antiarrhythmic effect. We analyzed in a prospective randomized study the clinical efficacy of SOT in comparison to the betablocker metoprolol (MET) in 112 patients (P) with an implanted cardioverter defibrillator. In all P SOT did not prevent induction of VT/VF during electrophysiologic testing. The groups did not differ in respect to age, underlying cardiac disease (CD $p = 0.53$), left ventricular function (EF, $p = 0.72$) or clinical arrhythmia (VT/VF, $p = 0.41$).

	Age	CD	EF	VT/VF
Sotalol (n = 55)	61 $\pm$ 7	34 CAD (67%) 10 DCM (18%)	37 $\pm$ 14	29 (49%)/26 (51%)
Metoprolol (n = 57)	63 $\pm$ 8	43 CAD (77%) 8 DCM (11%)	38 $\pm$ 14	33 (58%)/24 (42%)

Mean follow-up in P treated with SOT was 891 $\pm$ 537 days, in P receiving MET the follow-up was 742 $\pm$ 505 days ($p = 0.42$). 51% of the P treated with SOT had a VT/VF episode (follow-up of 208 $\pm$ 328 days) compared to 47% of P treated with MET (follow-up 238 $\pm$ 232 days, $p = 0.33$). 1 P in the SOT group had a torsades de pointes.

Conclusion: The pure beta-blocker Metoprolol is as effective as Sotalol in preventing recurrences of VT/VF in patients with an implanted cardioverter defibrillator.

11:15

745-4 Defibrillation with Different Energy Levels and During Sleep: Impact on Pain Perception

A. Natale, K.H. Newby, J. Brandon, M. Kearney, S. Beheiry, P.H. Henderson, A. Wolverton, R. Fanelli, E. Pisano'. *Duke University Medical Center/VA Medical Center, Durham, NC, USA, Casa Sollievo Della Sofferenza, San Giovanni Rotondo, Italy*

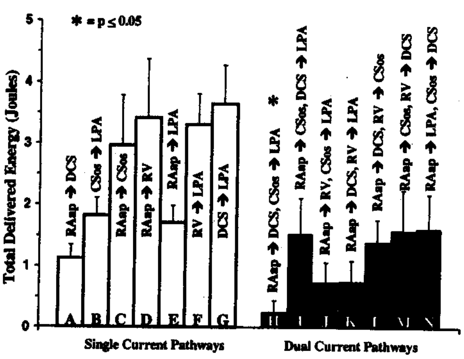
Discomfort following defibrillation shocks remains a significant concern and may reduce patient acceptance of implantable devices for atrial fibrillation. We assessed whether shocks of different energy levels or delivered at night during sleep could reduce the perception of pain. In 29 patients with implantable defibrillator, shocks of 1 and 5 Joules (group 1–10 patients), and of 5 and 10 Joules (group 2–19 patients) were randomly delivered with the patients awake. In group 2, the 10 Joules shock was delivered again during the night while patients were asleep. Patients were asked to grade the intensity of discomfort using two different scales (from one to ten, and from absent to extremely severe). Patients were also asked if they tolerated better the asleep vs. the awake shock. No difference in discomfort was reported in group 1 between 1 and 5 Joules (score 1 Joule 6.3 $\pm$ 1.9 vs 5 Joules 6.0 $\pm$ 2.1, p = NS) and in group 2 between 5 and 10 Joules shocks (score 5 Joules 6.1 $\pm$ 2.2 vs 10 Joules 5.8 $\pm$ 2.0, p = NS). Usually the second shock was perceived as stronger regardless of the energy used ($p < 0.0005$). In 14 patients shock during sleep was better tolerated ($p < 0.0001$), 3 patients did not report any difference, and the remaining two patients felt more uncomfortable due to their subsequent inability to fall asleep again. In conclusion: (1) atrial defibrillation during sleep may reduce the discomfort associated with energy delivery; and (2) shocks with energy levels of 1 to 10 Joules do not appear to be perceived differently.

11:30

745-5 Dual Current Pathways for Internal Atrial Defibrillation in Sheep: Marked Reduction in Defibrillaton Threshold

R.A.S. Cooper, W.M. Smith, R.E. Ideker. *The University of Alabama at Birmingham, Birmingham, Alabama, USA*

The purpose of this study was to compare the atrial defibrillation efficacies of multiple single and dual current pathways. In 6 adult sheep, transvenous defibrillation electrodes were positioned in the right atrial appendage (RAap),



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